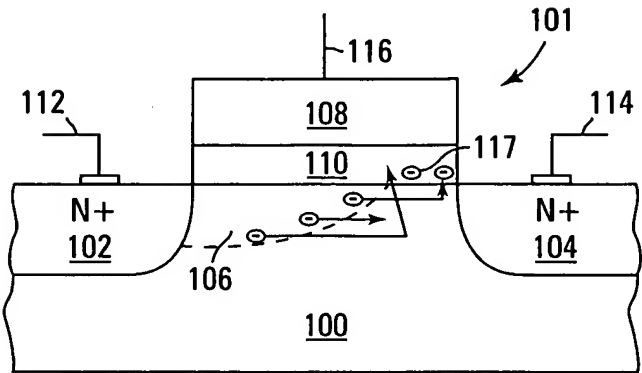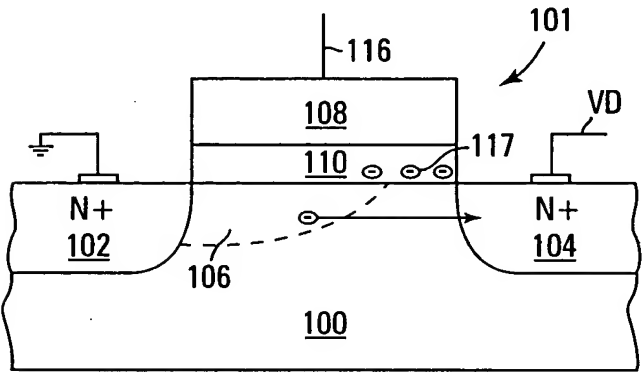REPLACEMENT SHEET
Inventor: Leonard Forbes
VERTICAL NROM HAVING STORAGE DENSITY OF 1 BIT PER 1F2
Atty Docket No. 400.250US01

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Fig. 1A
PriorArt

Fig. 1B
PriorArt

Fig. 1C
PriorArt

REPLACEMENT SHEET
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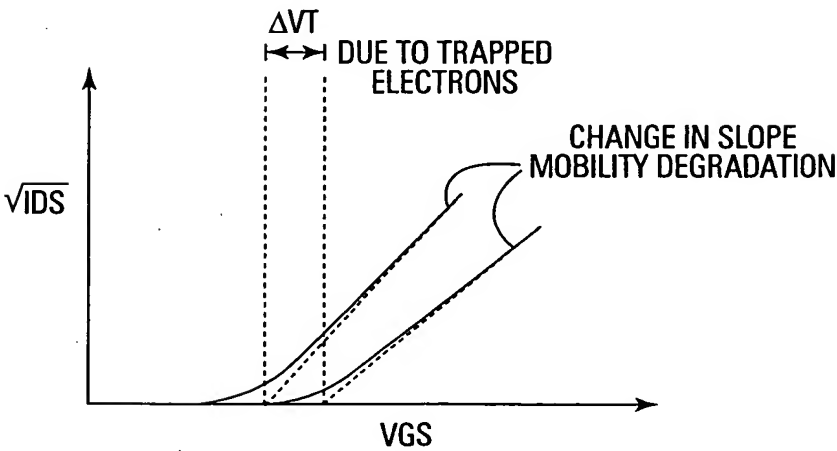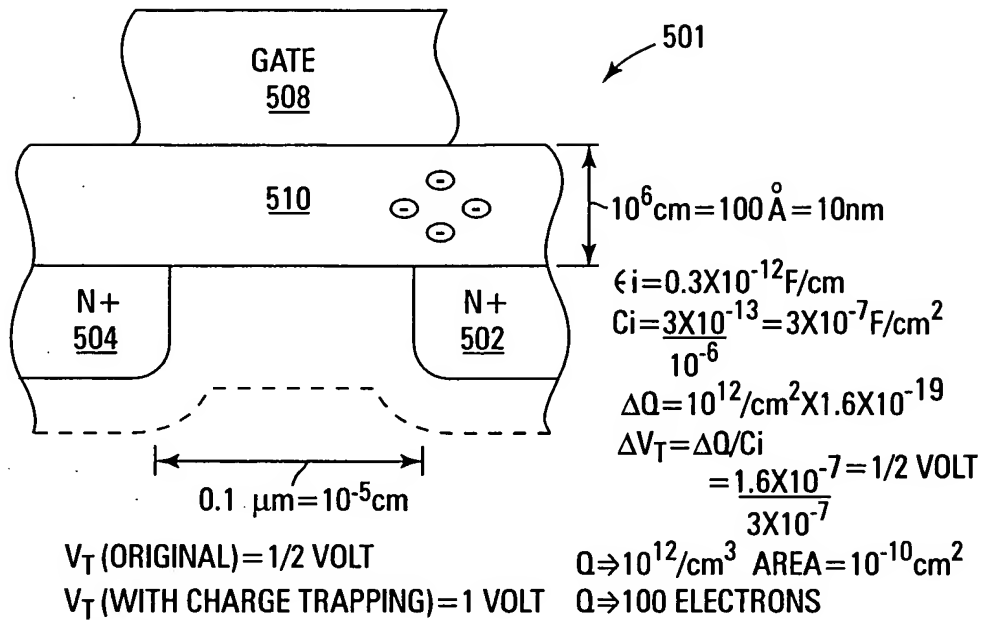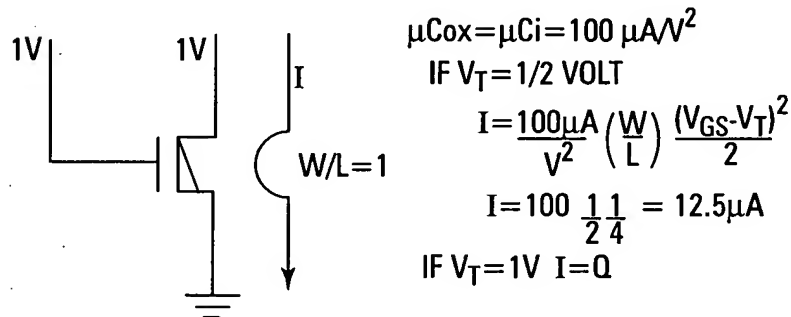Atty Docket No. 400.250US01

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GATE
508

501

510

$\sim 10^6 cm = 100 \overset{\circ}{A} = 10nm$

N+
504

N+
502

$\epsilon_i = 0.3 \times 10^{-12} F/cm$

$C_i = \dfrac{3 \times 10^{-13}}{10^{-6}} = 3 \times 10^{-7} F/cm^2$

$\Delta Q = 10^{12}/cm^2 \times 1.6 \times 10^{-19}$

$\Delta V_T = \Delta Q / C_i$

$\qquad = \dfrac{1.6 \times 10^{-7}}{3 \times 10^{-7}} = 1/2 \ VOLT$

$0.1 \ \mu m = 10^{-5} cm$

V_T (ORIGINAL) = 1/2 VOLT

V_T (WITH CHARGE TRAPPING) = 1 VOLT

$Q \Rightarrow 10^{12}/cm^3 \quad AREA = 10^{-10} cm^2$

$Q \Rightarrow 100$ ELECTRONS

Fig. 5A

1V 1V I

W/L=1

$\mu Cox = \mu C_i = 100 \ \mu A/V^2$

IF V_T = 1/2 VOLT

$I = \dfrac{100 \mu A}{V^2} \left(\dfrac{W}{L}\right) \dfrac{(V_{GS} - V_T)^2}{2}$

$I = 100 \ \dfrac{1}{2} \dfrac{1}{4} = 12.5 \mu A$

IF V_T = 1V I = 0

Fig. 5B

601

+

−

30fF   1.5V   Q=50fC
READ OVER 5ns

$I \sim 50fC/5ns = 10\mu A$

$Q = \dfrac{50fC}{1.6 \times 10^{-19}} = 30 \times 10^4 = 300,000$ ELECTRONS

BIT LINE

CONVENTIONAL DRAM

Fig. 6
Prior Art